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ABSTRACT

This paper describes Project LITERACY-HI, an ongoing 3-year federally funded study of the benefits of electronically enhanced text for mainstreamed students with hearing impairments. Preliminary information documents the ongoing difficulties with reading experienced by most students with hearing impairments. The project is creating electronic versions of content area textbooks, which include multimedia resources that support the reader's comprehension. Specifically, the project is: (1) identifying the types of electronic text enhancements desired by these students; (2) exploring factors associated with appropriate and effective text enhancements; (3) investigating effects of electronically enhanced materials on students' literacy skills and academic achievement; and (4) examining whether this type of assistive technology can be realistically implemented in general education classrooms. Application of the electrotext authoring system to enhance one story is described. Extensive detail and analysis on how one student (in a pilot study with six students) used the system during three sessions is provided. Preliminary conclusions include: it was relatively easy for students to learn the basic computer operations, and students often needed to be guided to use the additional resources, especially the text-based resources. Continued refinement and further testing is planned for the project's second year. (Contains 21 references.) (DB)

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ED 385 026

Project LITERACY-HI[1]: Hypermedia for Readers with Hearing Impairments

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AS MARIA[2] WALKS INTO HER 8TH GRADE SOCIAL STUDIES CLASS SHE FACES A HOST OF LEARNING challenges. Like all students, she must listen to lectures, take notes, read textbooks, answer questions, work alone, work in groups, keep track of assignments, complete projects, and take tests. Unlike most of her classmates however, Maria confronts an additional challenge: since birth she has had a moderate to profound sensorineural hearing loss in both ears. This loss is partially compensated for by hearing aids (when they're working), by the presence of an American Sign Language (ASL) interpreter in some classes, and by the help she receives from a teacher for the hearing impaired who works with her once or twice a week. The focus of this assistance is on speech, written language, and vocabulary/reading skills. This all helps, and with Maria's hard work and positive attitude toward school, she gets by. But, when Maria must use her 4th grade reading skills to confront a 8th grade textbook, she is at a severe disadvantage.

Maria's below-average reading skills are typical of students with hearing impairments. Students who have been deaf since birth frequently do not have the experiential, cognitive and linguistic base needed to read fluently beyond the 4th grade level (King & Quigley, 1985). Their reading problems include an inability to (a) process text efficiently, (b) comprehend content or (c) understand text structure (King & Quigley, 1985). Reading comprehension skills are particularly difficult to acquire and the average hearing-impaired student progresses at roughly one third the rate of hearing students on measures of reading comprehension (Wolk & Allen, 1984). Furthermore, these deficits do not appear to improve with age. Although hearing-impaired students' vocabularies tend to increase in adulthood, their reading abilities

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Figure 1. Maria.

do not (Hammermeister, 1971; King & Quigley, 1985). For example, Trybus & Karchmer (1977) found that at age 20, the median reading grade level of 6,871 hearing-impaired individuals was only 4.5 and only 10 percent could read above the 8th grade level.

There are very good reasons why acquiring information from text written beyond the 4th grade level is so difficult for students with hearing impairments. Hearing-impaired students have difficulty with the uncontrolled vocabulary of more advanced text materials because their receptive and expressive vocabularies are limited (Cartwright, Cartwright, & Ward, 1989) and significantly more concrete than those of hearing children (Lowenbraun & Thompson, 1986). Furthermore, hearing-impaired students have difficulty handling the higher concept load and more abstract use of language found in advanced texts because they do not have the experiential and linguistic expertise to comprehend what the author is trying to convey. Figurative language is another challenge for hearing-impaired students (Boatner & Gates, 1969; Giorcelli, 1982; King & Quigley, 1985; Payne, 1982), with idiomatic expressions causing particular difficulty for hearing-impaired children above the 3rd grade (Conley, 1976; King & Quigley, 1985).

Help for students with hearing impairments like Maria is under investigation in Project LITERACY-HI, a three year federally funded study of the benefits of electronically-enhanced text for mainstreamed students with hearing impairments. The project is a collaboration between the Center for Electronic Studying at the University of Oregon and the Cascade Regional Program for the Hearing Impaired in Lane County, Oregon. The central effort of the project is to create electronic versions of content area textbooks that contain, in addition to the original text, multimedia resources that directly support a reader's comprehension. In the long term we would expect that students like Maria will take these electronic textbooks, loaded onto laptop computers, into their general education classes and use them in addition to and/or instead of the paper-based textbooks used by their classmates.[3]

The idea that computer technology can be used to enhance or support the reading skills of students with hearing impairments is not new. As early as 1980, educators saw the potential for using the computer to assist hearing-impaired students in reading content-area text materials. Arcanin and Zawolkow (1980), from the California School for the Deaf, voiced the belief that computer software should be used locally by teachers of hearing-impaired individuals to develop stand-alone lessons similar to textbooks. They advocated a lending library of lessons comprised of teacher-generated text in combination with pictures, labels and graphics to assist other teachers of deaf children. More recently, MacGregor and Thomas (1988) explored the use of a computer-mediated text system which provided hearing-impaired readers with access to an electronic dictionary and motivational learning activities to promote the application of vocabulary knowledge. Results showed that the more students accessed the electronic dictionary, the greater their vocabulary knowledge on post-treatment measures.

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The advent of videodisk technology has resulted in several explorations using sign language in combination with English text to enhance students' reading skills (Hanson & Padden, 1990; Prinz, 1991). For example, Hanson and Padden (1990; 1992) developed and researched a multimedia program for bilingual language instruction called *HandsOn*. The combination of text and video enables simultaneous display of American Sign Language and English text, thus allowing hearing-impaired students to access ASL translations of English stories, to see correspondences between printed English and signed ASL, and to practice writing English sentences and paraphrasing ASL stories into English words. This method allows deaf children's competence in ASL to improve their reading and writing skills in English (Hanson & Padden, 1990).

Until the introduction of computers and other forms of advanced technology it was difficult to insert supportive information such as ASL translations into written material in ways that did not interfere with reading the text. Electronic text, however, enables signed translations, as well as definitions, pictures, pronunciations etc. to be hidden from view until called for by the reader. Fluency is therefore not interrupted unless the reader senses a lack of comprehension and a need for one or more of the supportive text enhancements. Emerging research on the use of electronic text enhancements to improve reading comprehension suggests this may be an ideal way to support students who have difficulty understanding, for whatever reason, the materials they are expected to read in school (e.g., Anderson-Inman, Horney, Chen & Lewin, 1994; MacGregor & Thomas, 1988; Reinking & Schreiner, 1985; Wise & Olson, 1994).

Project LITERACY-HI is a three year research effort to explore the ways in which and the extent to which electronically enhanced text can be useful to students with hearing impairments. Specifically, the goals of the project are to (a) identify the types of electronic text enhancements desired by students with hearing impairments, (b) explore the factors associated with appropriate and effective text enhancements for this population, (c) investigate the effects of reading electronically enhanced materials on students' literacy skills and academic achievement, and (d) examine whether this type of assistive technology for hearing-impaired students can be realistically implemented in general education classes long-term.

The following sections will provide a description of the electronic documents under development for Project LITERACY-HI, sample data from our initial pilot study, and speculations about future challenges.

ElectroText Authoring System

The electronic documents developed and studied in Project LITERACY-HI are created using a *HyperCard* (Apple Computer Inc., 1987) based authoring interface called the *ElectroText Authoring System*. Figure 2 shows a page from an *ElectroText* document.

This page comes from a test-bed document based on the short story, *Old Ben Bailey Meets His Match* (Justus, 1976).The text of *Old Ben Bailey* is divided into 19 such pages, including a title page (page 1) and a page of comprehension questions (page 19). The menu bar at the top provides standard File, Editing, and Font operations, along with *ElectroText* features for navigating from page to page (duplicated on the Navigation Palette at the lower right), marking pages for future reference and gaining access to the different supporting resources.

The words underlined in the text are known as "keys." When a reader clicks a key, a "Resource Window" appears displaying icons representing the different resources (text enhancements) available for that key. For *Old Ben Bailey* there are six types of resources: Sounds, ASL Translations, Pictures, Animations, Definitions, and Explanations. Clicking an icon in the Resource Window opens another window with the specified resource. In

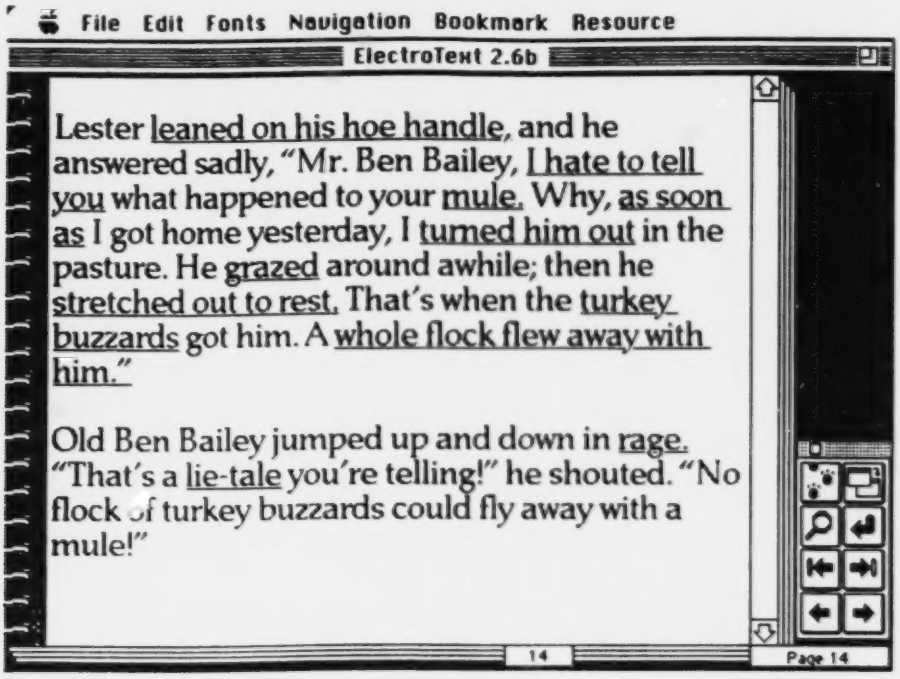
File Edit Fonts Navigation Bookmark Resource
ElectroText 2.6b
Lester leaned on his hoe handle, and he answered sadly, "Mr. Ben Bailey, I hate to tell you what happened to your mule. Why, as soon as I got home yesterday, I turned him out in the pasture. He grazed around awhile; then he stretched out to rest. That's when the turkey buzzards got him. A whole flock flew away with him."
Old Ben Bailey jumped up and down in rage. "That's a lie-tale you're telling!" he shouted. "No flock of turkey buzzards could fly away with a mule!"
14
Page 14

Figure 2. Page 14 from *Old Ben Bailey*.

Figure 3, three resource windows and the associated resources have been opened. For the key "I hate to tell you," there are two resources available, an explanation and a translation in ASL. For "mule," there is a pronunciation (sound), a picture, and a definition. And for "whole flock flew away with him," there is a pronunciation, an explanation and an animation.[4] Of the 1487 words in *Old Ben Bailey*, 151 words and phrases have been identified as keys,[5] and those keys are supported with a total of 380 resources.[6]

Authoring an *ElectroText* document involves a number of interrelated tasks. Specifically, the production team must identify the words and phrases readers may have difficulty comprehending; decide what types of support resources would enhance comprehension of each word or phrase; and then write, draw, find, manipulate, and/or produce these resources. For *Old Ben Bailey* this took approximately 200 hours.

Part of our research is to determine a set of rules guiding *ElectroText* authors as they identify keys and produce the needed resources. For example, we decided that:

- Every key should be supported by both a pronunciation and a text-based resource (either a definition or an explanation).
- Definitions are used for individual words and are supplemented with a sentence relating to the context.
- Explanations support longer chunks of text like phrases and sentences.
- Both explanations and definitions are written to fit back into the original sentence so as to disrupt the reading as little as possible.
- Pictures are usually used with nouns and animations with verbs.

We expect the initial set of rules for selecting keys and producing resources will evolve substantially as we gain more experience with

hearing-impaired readers and we see this as a major research focus.

Pilot Study

In our first pilot study, six students with hearing-impairments read our electronic version of *Old Ben Bailey*, among them Maria. Our intent in this study was to test the operation of *ElectroText* documents in the hands of students, to gain some experience in working with students with hearing impairments, and to evaluate how well our data collection techniques worked.

Each of the six students worked with *ElectroText* documents for four to six sessions, each lasting about an hour. In the first two sessions, students worked with a simplified document containing no resources. The time was used to train students to operate a laptop computer and to navigate among the pages of an *ElectroText* document. Next, a session or two was used to introduce the idea of electronic resources and how they might be helpful. As students gained proficiency in operating *ElectroText*, they were asked to read the entire story for the purpose of being able to

Lester turned on his hoe handle, and he answered sadly, "Mr. Ben Bailey, I hate to
you what happened to your mule. Why, as
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buzzards got him. A whole flock flew away
him."
Old Ben Bailey jumped up and down in rage.
"That's a lie-tale you're telling!" he shouted. "No
flock of turkey buzzards could fly away with a
mule!"

Figure 3. Examples of resources.

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Event Number	Event Time	Page	Time on Page	Action Taken	Object
276	11:42:30	13	74	Go next page	
277	11:42:59	13		Open resource	crooked finger
278	11:43:11	13		play movie	crooked finger
279	11:43:26	13			crooked finger
280	11:43:37	13		Close resource	crooked finger
281	11:43:44	14	191	Go next page	
282	11:43:59	14		Open resource	leaned on hoe
283	11:44:19	14		Play sound	leaned on hoe
284	11:44:39	14		Open explanation	leaned on hoe

Figure 4. Monitor fragment.

explain the meaning of the story's title *Old Ben Bailey Meets His Match.*[7] After finishing, the students were also given a short vocabulary and comprehension test.

We collected data from three sources as students read. We videotaped each session, ran a screen capture program called *CameraMan* (Vision Software, 1992) to make a digital movie of all screen activity, and used an electronic event monitor to produce a transcript of all reader interactions with the program (e.g. moving from one page to another or opening a resource). Figure 4 shows a fragment of a monitor transcript taken from Maria's third session with *Old Ben Bailey*. Each line in Figure 4 represents one event and is identified by the number shown in the first column (the complete transcript has 313 events). The second column gives the time of day that the event took place and the third column lists the number of the page that appeared on screen. The fourth column shows the amount of time spent on each page visit (the total for the entire document was 6411 seconds or 106 minutes). The fifth column describes the action taking place, and if there was as object of that action (e.g., opening a particular resource window)m the object is indicated in the last column.

From these three data streams we can construct a detailed, moment by moment description of what readers do as they read *ElectroText* documents. From this we can make inferences about the operation of the program, how readers construct their understanding of what they read, and what affect the various text enhancements may have had on the process.

Maria Reads *Old Ben Bailey*

Maria worked with *ElectroText* documents in six sessions spread over a period of a month in the spring of 1994. The first three sessions were spent with a navigation only document learning about the computer and the *ElectroText* procedures for interacting with the text. The last three sessions were spent reading *Old Ben Bailey*. An overview of Maria's work with *Old Ben Bailey* is shown in Figure 5. Graphics such as this are called "event charts" and are derived from the *ElectroText* monitor transcript. Each bar on the graph depicts one event from the transcript. The length of the bar represents the type of event. When read from left to right, the bars show the sequence of reading events, but do not show their elapsed time. Upward bars show the order in which pages of text are visited, and the downward bars show the use of resources.

Maria's event chart is divided into three sections, reflecting her three sessions with *Old Ben Bailey*, and has been annotated to point out some important events. Most of the first session was spent introducing Maria to the different types of resources available to support her reading, using keys from the Title/Intro-

duction page. Because this training was under our control, not Maria's, these events have been edited out of the chart. Once she seemed to understand how to access available resources, Maria read the first two pages of the actual story, getting help and advice as she read. After that went well, Maria was asked to continue reading and was told she would be asked about the meaning of the title when she had finished. It is at this point that Maria's event chart begins.

As the chart shows, Maria moved steadily from page to page, reading intently,[8] but making no effort to access any resources. After a few pages, Maria abruptly turned and indicated she was ready to explain the title, and so was presumably done with this assignment. She stated "I think that Lester that is matching Old Ben ... Old Ben has Funny ... Lester's worrying about Funny ... and the match... "We told Maria that no, that wasn't quite it, and that she was welcome to finish the whole story

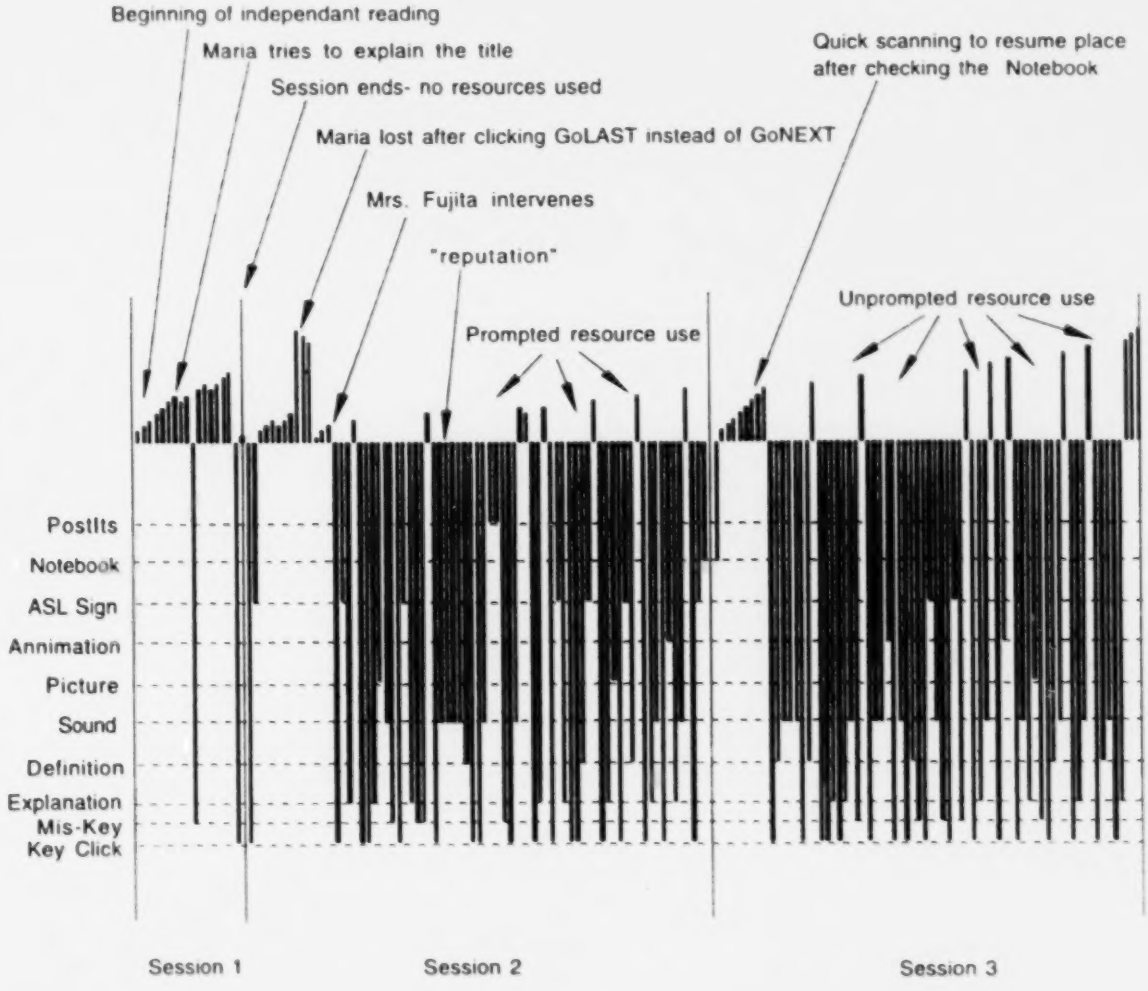

Figure 5. Annotated event chart for Maria.

before trying again. With that rejection, Maria slouched back in her desk and continued reading until the end of the period (See Figure 6). By the end of the session, she had only clicked on only two words in the story, the first a miskey (clicking on a word which isn't a key), and the second by accident as she was quitting the program.

In Session 2 Maria started reading from the beginning of the story, even though she had reached page 12 the day before. She was plodding along, again without using any of the resources, until Mrs. Fujita (Maria's teacher for the hearing impaired) intervened (see Figure 7). Mrs. Fujita hadn't been present during the first session, and when she saw how Maria was working, she began prompting her with questions and pointing out places to access resources. This continued throughout Session 2. Interestingly, during this session Maria began to make regular use of the pronunciations provided for every key, accessing some of them multiple times. We had been unsure of the value of sound in documents intended for hearing-impaired readers, but its importance became clear watching Maria use that resource to add new words to her speaking vocabulary (see Figure 8).

During the third and last session Maria was left to make her own choices about which keys and resources to access. As can be seen from the event chart (Figure 5), Maria continued to make frequent use of the different types of resources available. She began reading the document on page 9, finding the page where she had stopped in the previous session by looking at the Notebook message she'd left for herself (at our suggestion). Her new level of engagement with the text (as seen in Figure 9) contrasts sharply with that seen in the Session 1 (Figure 6).

After finishing the story Maria was able to provide a better explanation of the title, one which now conveyed the gist of its meaning: "He was being so rude and how he match Lester is because he told old Ben Bailey the same thing." On the short vocabulary/comprehension test Maria correctly answered all

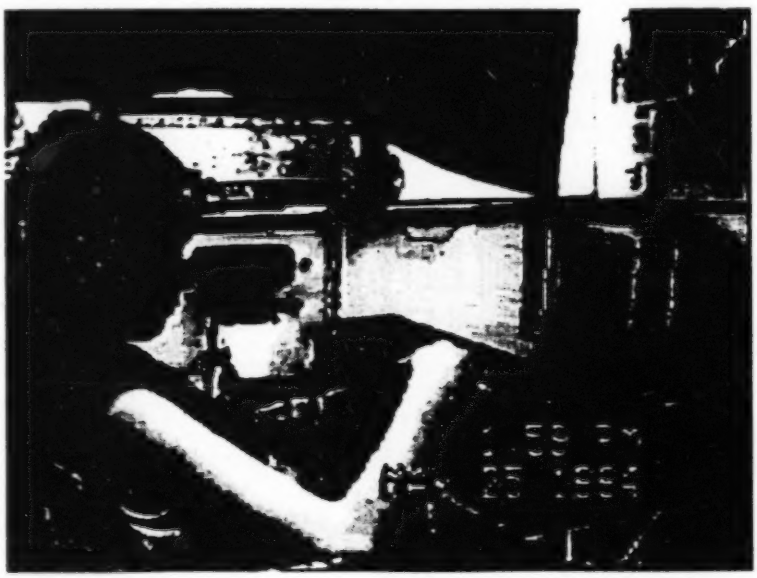

Figure 6. Maria reading in Session 1.

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Figure 7. Mrs. Fujita intervenes.

of the comprehension questions and missed only one of the vocabulary questions. She chose "talk in an angry way" as the definition for "bemean" rather than "say bad things about," the definition given for the key "bemeaned" on page 17 of the story. Maria had not accessed this resource.

Table 1 shows a tabulation of the keys and resources that Maria did access. The table is organized by page visits- omitting those visits where no resources were used, and shows the sequence of the resources accessed for each key Maria clicked. The session number, and the number of seconds each visit encompassed are listed beside the page number in the left column. The next column identifies the word or phrase which had been marked as a key in the story. The numbers for each resource type indicate the sequence in which the resources for each key were accessed. For example, during her first visit to page 5 during Session 2 (lasting 359 seconds) Maria first clicked on the word "reputation," listened to its pronunciation four times and then read its definition. She then clicked on the phrase "Old Ben had a bad reputation," and only listened to its pronunciation. Maria next opened and closed the resource window for "corncribs" without using any of the resources. And finally, Maria listened to the pronunciation for "right in broad daylight." Later in Session 2, Maria visited page 5 again and looked at the explanation for this same key. Shaded cells indicate unavailable resources.

Figure 8. Maria listening for "reputation."

Figure 9. Maria reading in Session 3.

From these and the other data collected in our pilot study we were able to make several observations:

- It was relatively easy for students to learn basic computer and *ElectroText* operations, although improvements in

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speed and sound quality were warranted. Also, a mouse, rather than the Macintosh PowerBook track ball was needed for interacting with the document.

- No extraordinary communication measures were needed in order to work with our sample of students with hearing impairments. However, it was useful to have a teacher such as Mrs. Fujita working with us, especially during introductory sessions.
- Students with hearing impairments do not automatically see the value in the electronic resources provided to enhance their comprehension. Guided reading, under the direction of an educator who knows the student's reading and comprehension skills can be tremendously helpful in focusing the reader's attention on potentially useful resources.
- Our data collection techniques produce a rich assortment of data more than adequate for the task of describing how hearing-impaired readers interact with *ElectroText* documents. We must, however, become more ambitious and creative in our measures of reading comprehension.
- Our readers need better instruction on how to use text based resources. In particular, they need to know how to integrate a definition or explanation back into the original context.
- Some readers are drawn to the multimedia resources and tend to use them more often and prior to using text based resources.

Future Plans

As Project LITERACY-HI enters its second year we expect to broaden the range of our activities. While the *ElectroText Authoring System* itself is now substantially complete, we expect to continue making improvements in two areas- its speed and in the types resources provided to readers. The speed of the program during the pilot study was clearly inadequate, with several seconds being required to move from one page to another or to access a resource. Slowness is always bothersome, but in this environment it led to other problems. Maria, for example, was particularly prone to making multiple clicks in a effort to hurry the program along. These were interpreted by *ElectroText* as clicks on words which were not keys (labeled "mis-keys" in Figure 5) and Maria was constantly frustrated by messages indicating "No resources available for that word."

We have two new types of resources in mind for future development. The most important is called "Graphic Overviews." This resource will provide a flexible environment for displaying concept maps, timelines, flowcharts and other types of graphics designed to give the reader a conceptual overview. We also plan to embed comprehension questions within the text and anticipate these will help students monitor their own understanding of what they are reading.

We have also begun the process of assessing the appropriateness and effectiveness of each resource type. By "appropriateness" we mean the correspondence between our intended meaning for a resource and the reader's interpretation of it. We must determine, for example, whether as she strained to hear the pronunciation of "reputation" (see Figure 8), Maria was she able to recover enough of the sound for it to be useful. Perhaps the sound needs to be louder, or pitched differently, or read slower. Then, assuming our presentation of the sound resource for "reputation" is appropriate, we must assess whether listening to such pronunciations is an effective technique for improving Maria's comprehension of individual words and of the text as a whole. The results of these evaluations will be incorporated into the rules used to select keys and the rules to determine and produce resources.

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Table 1. Sequence of Resources Accessed by Page Visit

Page/Session (Sec.)	Description	Def.	Exp.	Sign	Pict.	Ann.	Snd
1/2 (158)	OLD BEN ... HIS MATCH			1			
2/1 (286)	hound dog				1		
3/2 (169)	hadn't the ... to scold		2	1			
4/2 (220)	get a whipping		1		2		3
	likely						
	fine notion		2	1			
5/2 (359)	reputation	5					1-4
	Old Ben ... bad reputation						1
	corneribs						
	right in broad daylight						1
5/2 (69)	right in broad daylight		1				
6/2 (250)	Mighty much ... to you		2	1			
	kept him after school						
	pupil	1		2			
7/2 (139)	leaning on the gate		1		2		
	stammered	2		1			
8/2 (177)	perk him up		1				2
	right down ... turkey buzzard		2			1	3
9/2 (189)	He swallowed ... his throat			1			
9/3 (270)	deceive	1					2-4
	notion	1					
10/3 (145)	stumped toe		1				
	hurts mighty bad						
	hurts mighty bad		1				2
11/3 (346)	But he ... his head					3	1-2
	manners						1
	manners	1					
	Mighty much ... the favor			1			2
	Mighty much ... the favor			1			
12/1 (70)	digging sweet potatoes						
12/3 (99)	as mad ... a hornet		1				2
13/3 (74)	crooked finger					1	
14/3 (191)	leaned on ... hoe handle		2		3		1
	turkey buzzards	1					2
15/3 (85)	mighty strengthy		1				2
16/3 (108)	pappy	1					2
	hip-and-hurrah		1				
Percentage of Resources Accessed:		67%	61%	75%	50%	75%	44%

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A last focus for our coming efforts is to devise effective techniques for teaching students to read in these supported text environments in ways that enhance their comprehension and learning. It is not enough to simply provide resources. Readers must also acquire the habits and meta-cognitive skills to use those resources to good effect. As we saw with Maria, students are sometimes perfectly willing to read along without gaining any real comprehension of the text, and without making any effort to understand more. Some readers are unwilling to make such efforts, some have been taught not to make such efforts,[9] and some have not yet learned to distinguish when they are and when they are not comprehending.

Finding ways to encourage resource use without mandating or overemphasizing it is an issue we will be investigating with some vigor. We do not want to have students accessing resources simply because they are there. The intent in providing students with electronically-enhanced text is to assist them in recognizing when they need support in order to comprehend what they are reading and then making sure that support is available. Past experience suggests that over utilization of resources may turn out to be as much of a problem as under utilization of resources. For example, some students become so enamored with specific resources that they spend all their time utilizing that resource and little or no time reading the text. We have seen this problem in previous research using earlier versions of ElectroText with at-risk students (Anderson-Inman & Horney, 1993; Anderson-Inman, Horney, Chen & Lewin, 1994). A subset of our sample made little effort to read the documents assigned, concentrating instead on seeking out, and repeatedly listening to every word pronunciation they could find. Having ignored the text and other resources, these "resource junkies" performed poorly on measures of comprehension. Although this has not yet developed as a problem with our hearing-impaired readers, we anticipate that their comprehension will be improved if we can help them to find a balance between under and over utilization of available resources.

By the end of our second year, given these improvements, we expect to be in a position where we can efficiently produce effective *ElectroText* documents, train readers to read them in appropriate fashions, and evaluate the effects of electronically supported text on reading comprehension and academic achievement. We will then be ready to take *ElectroText* into students' general education classrooms and test whether electronic text enhancements in a hypermedia environment are of long-term benefit to readers with hearing impairments.

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End Notes

[1] Project LITERACY-HI: *L*iteracy *I*mprovement via *T*ext *E*nhancements and *R*eading *A*ssistance for *C*hildren and *Y*outh with *H*earing *I*mpairments.

[2] The names of all project participants are pseudonyms.

[3] Note that this strategy of supporting readers within their regular educational context imposes constraints on the electronic documents we create. We can not, for instance, rewrite poorly written textbooks or exploit all the features available in a fully computerized hypermedia reading environment. Advantageous as such things might be, doing them would shift the focus of the project away from supporting readers, towards creating a new curriculum.

[4] The text of page 14 shown in Figure 3 also contains two bullets. These are markers for "Postits," which can be inserted at any point in the text. Clicking on the bullet opens a

window where notes or messages can be written. The system also provides readings with a Notebook (not shown) to be used for more general notes.

[5] Note that while in *Old Ben Bailey* only individual words and short phrases were used as keys, we can also attach resources to larger units of text, e.g. sentences, paragraphs and whole pages. We also expect to expand the types of resources available.

[6] When reading an *ElectroText* document such as *Old Ben Bailey*, it is unlikely that a student would have the large number of windows depicted in Figure 3 on the screen at one time. Instead, *ElectroText* pages in this document were designed so that a reader is aware of the words or phrases for which resources have been provided and can access those resources when comprehension is uncertain. However, readers do have the option of opening several resources at once and can arrange them on the screen as needed.

[7] A short synopsis: Lester lives with his father in Tennessee where they raise foxhounds. One day Lester's dog Funny follows him to school, where dogs aren't allowed. Lester decides to leave Funny with Old Ben Bailey, a man of questionable reputation. Racing back after school, Lester stumps his toe and arrives limping at Ben's house where he is told that a turkey buzzard has carried Funny away. Not believing this story, Lester asks to barrow Ben's mule so he won't have to walk home on a bad foot. Lester doesn't return the mule and when Ben arrives demanding it, Lester claims that a whole flock of buzzards have carried the mule away. Ben realizes he has been out done in the telling of wild tales and returns Funny.

[8] All six students read very intently throughout their experience with *ElectroText*. However, we don't attribute this to any compelling interest there may be in the story of Lester's struggle with Old Ben, or in reading an *ElectroText* document, but rather to the fact that there were always three or four adults intently watching this intense reading, not to mention a video camera.

[9] For example, taking the time to look a word up in the dictionary is so disruptive to the reading process that some teachers discourage this practice.